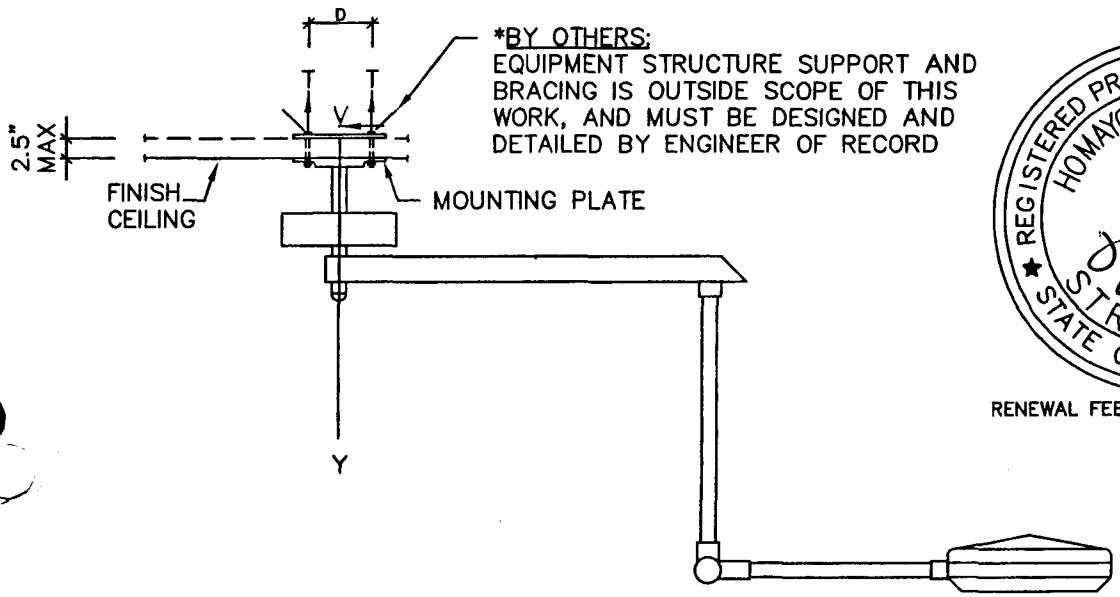
FIROUZI CONSULTING ENGINEER, INC.		
SKYTRON SURGICAL PRODUCTS	DES.	SHEET
STELLAR SERIES - ST 23 / ST23TV FOR SEISMIC ZONE (4), SOIL PROFILE (Sd) NEAR SOURCE FACTOR = 1.5	FCE JOB No. DATE: 6-21-03	1 OF 4 SHEETS

SEISMIC ANCHORING BOLT DESIGN
ST23 / ST23TV


D
V
2.5" MAX
FINISH CEILING
*BY OTHERS:
EQUIPMENT STRUCTURE SUPPORT AND BRACING IS OUTSIDE SCOPE OF THIS WORK, AND MUST BE DESIGNED AND DETAILED BY ENGINEER OF RECORD
MOUNTING PLATE
Y

ELEVATION

RENEWAL FEE DUE DATE: 06-30-06

NOTES:

1. SCOPE OF WORK: DESIGN OF BOLTS CONNECTING MOUNTING PLATE TO STRUCTURE ONLY.
2. FORCES ARE DETERMINED PER 2001 CALIFORNIA BUILDING CODE – SECTION 1632A, (INCLUDING UP TO DATE REVISIONS) AND HAVE BEEN FACTORED TO REPRESENT WORKING DESIGN LOADS, NOT ULTIMATE
3. FORCES ARE MAXIMUMS AND OCCUR WHEN EQUIPMENT IS MOVED TO ITS MOST ECCENTRIC POSITION.
4. PROVIDE CEILING STRUCTURE DESIGNED AND DETAILS TO SUPPORT WEIGHTS AND FORCES SHOWN (BY ENGINEER OF RECORD FOR THE BUILDING)
5. ENGIINEER OF RECORD TO DESIGN, DETAIL AND VERIFY STRUCTURE AND/ OR EXISTING LIGHT SUPPORT TRACTS TO SUPPORT INDICATED LOADS
6. HORIZONTAL FORCES AND MOMENT MAY OCCUR IN ANY DIRECTION, ACTING AT THE TOP OF MOUNTING PLATE.

DESIGN CRITERIA:

FORMULA 32A-1: $F_P = 4.0\ Ca*Ip*Wp$

TABLE 16A-Q : $Ca = 0.44*Na = 0.44*1.5 = 0.66$ (For zone 4 & S_D)

TABLE 16A-K : Ia = 1.5 (For essential facility)

$\therefore F_P = (4.0)(0.66)(1.5)Wp = 3.96\ Wp$ (For LRFD)

$F_P = 3.96Wp/1.4 = 2.83Wp$ (For ASD)

FORMULA 30A-1: $E = p*E_h + E_v$

$E_h = F_P$

p = 1.0 (FOR COMPONENT)

$E_v = (0.5)Ca*Ip*Wp$

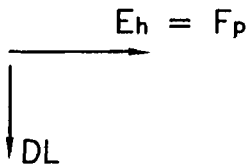
$= (0.5)(0.66)(1.5)Wp = 0.5Wp$ (For LRFD)

$= 0$ (For ASD)

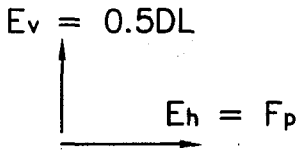
SECTION 1630A.11: $E_v = (0.7)Ca*I*Wp$

$= (0.7)(0.66)(1.5)/1.4 = 0.5Wp$ (For ASD) [NET UPLIFT FORCE]

LOAD COMBINATION CASE A



LOAD COMBINATION CASE B



BY COMPARISION LOAD, COMBINATION A GOVERNS

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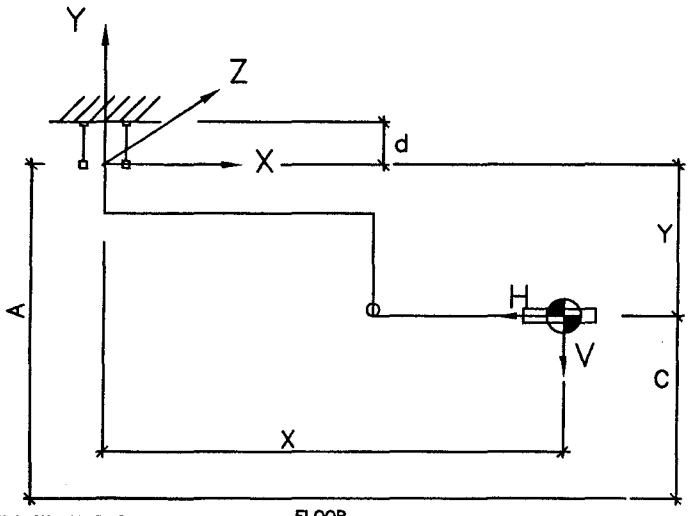
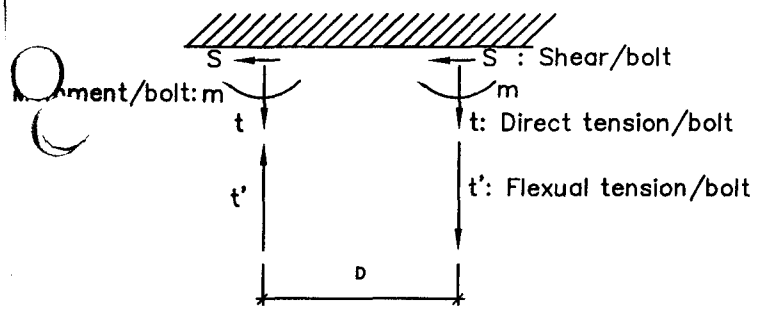
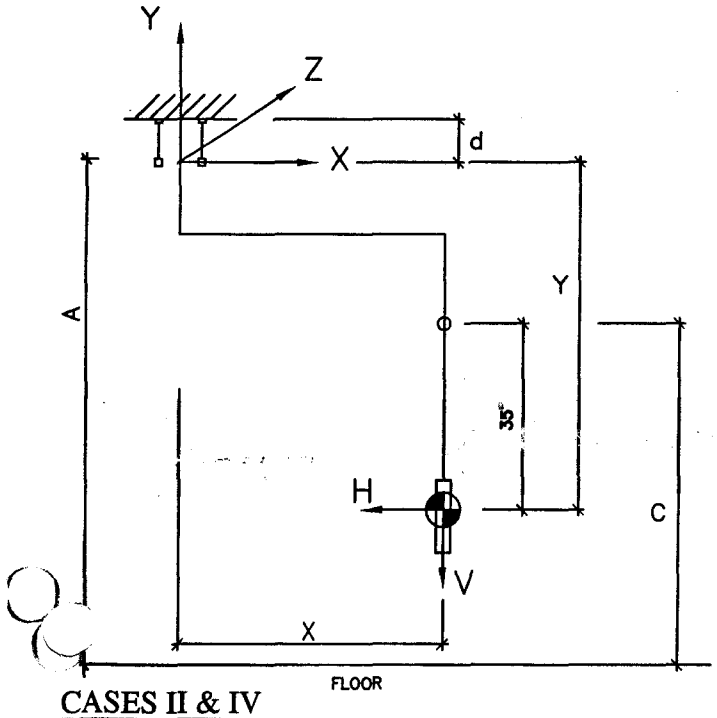


CASES I & III





CASES II & IV

A: MAX FLOOR TO MOUNTING PLATE DISTANCE
A = 10'-0" = 120"
C = 80"
Vd : Dead Load
Ve : Vertical Seismic Load
He : Horizontal Seismic Load

CASE I (FIXTURE AT HIGH POSITION)

d = 2.5 "
D = 9.5 "
Vd = 119.0 #
Y = A-C = 120.0 - 80.0 = 40.0 "
X = 70.5 "
Ve = 0.50 x 119.0 = 58.9 #
He = 2.83 x 119.0 = 336.6 #
S = 336.6 / 4 = 84.2 # per bolt
t = (119.0 + 58.9)/ 4 = 44.5 # per bolt
Total Mzz = (119.0 + 58.9)x 70.5 + 336.6 x 40.0 = 26006 "#
t' = 26006 /(9.5 x 2) = 1368 # per bolt
m = 84.2 x 2.5 = 210.4 "# per bolt

CASE II (FIX TURE AT LOW POSITION)

d = 2.5 "
D = 9.5 "
Vd = 119.0 #
Y = (A-C)+35 = 40 + 35 = 75 "
X = 35"
Ve = 0.50 x 119.0 = 58.9 #
He = 2.83 x 119.0 = 336.6 #
S = 336.6 / 4 = 84.2 # per bolt
t = (119.0 + 58.9)/ 4 = 44.5 # per bolt
Total Mzz = (119.0 + 58.9)x 35.0 + 336.6 x 75.0 = 31471 "#
t' = 31471 /(9.5 x 2) = 1656 # per bolt
m = 84.2 x 2.5 = 210.4 "# per bolt

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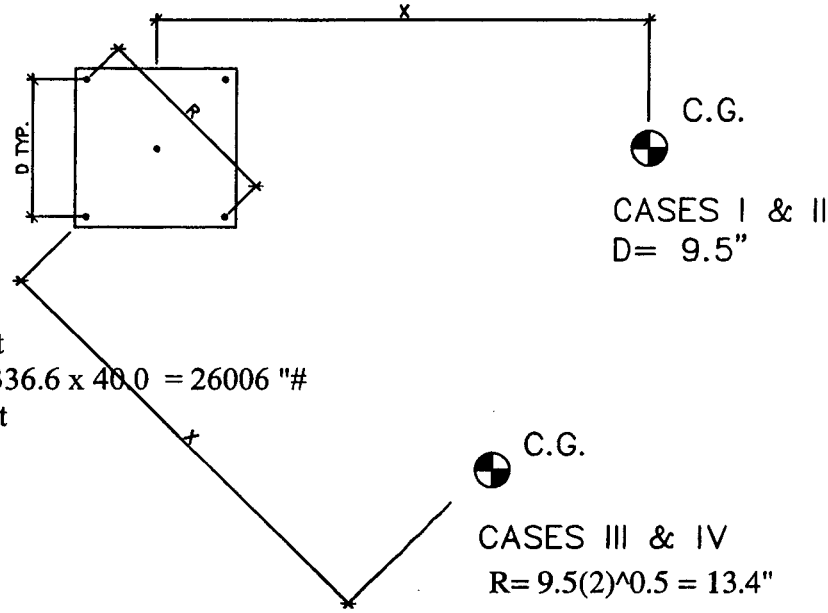
CASE III (Same As CASE I, Lateral Forces Applied Diagonaly To Mounting Plate)



d = 2.5 "
R = 13.4 "
Vd = 119.0 #
Y = 40.0 "
X = 70.5 "
Ve = 0.50 x 119.0 = 58.9 #
He = 2.83 x 119.0 = 336.6 #
S = 336.6 / 4.0 = 84.2 # per bolt
t = (119.0 + 58.9)/ 4 = 44.5 # per bolt
Total Mzz = (119.0 + 58.9)x 70.5 + 336.6 x 40.0 = 26006 "#
t' = 26006 /(13.4 x 1) = 1935 # per bolt
m = 84.2 x 2.5 = 210.4 "# per bolt

CASE IV
(Same As CASE II, Lateral Forces Applied Diagonaly To Mounting Plate)

d = 2.5 "
R = 13.4 "
Vd = 119.0 #
Y = 75.0 "
X = 35.0 "
Ve = 0.50 x 119.0 = 58.9 #
He = 2.83 x 119.0 = 336.6 #
S = 336.6 / 4.0 = 84.2 # per bolt
t = (119.0 + 58.9)/ 4 = 44.5 # per bolt
Total Mzz = (119.0 + 58.9)x 35.0 + 336.6 x 75.0 = 31471 "#
t' = 31471 /(13.4 x 1) = 2342 # per bolt GOVERNS
m = 84.2 x 2.5 = 210.4 "# per bolt

CHECK 3/4" DIA. A307 BOLTS

ALLOWABLE TENSION: 8800 #
ALLOWABLE SHEAR: 4400 #

S = 3.14*d^3/32 = 3.14 x(0.75)^3/ 32.0 = 0.04 "3
fv = 210.4 / 0.04 = 5082.0 PSI
Fb = 0.75 x 36000.0 = 27000.0 PSI

fv/Fv + ft/Ft + fb/Fb = 0.02 + 0.27 + 0.19 = 0.48 <1.0 OK

USE 3/4" DIA. A307 BOLTS